

Magnetic Flux Circulation during Dawn-Dusk Oriented Interplanetary Magnetic Field

E. J. Mitchell¹, R. E. Lopez², M.-C. Fok¹, Y. Deng², M. Wiltberger³, and J. Lyon⁴

¹NASA GSFC

²University of Texas at Arlington

³National Center of Atmospheric Research/High Altitude Observatory

⁴Dartmouth College

Magnetic flux circulation is a primary mode of energy transfer from the solar wind into the ionosphere and inner magnetosphere. For southward interplanetary magnetic field (IMF), magnetic flux circulation is described by the Dungey cycle (dayside merging, night side reconnection, and magnetospheric convection), and both the ionosphere and inner magnetosphere receive energy. For dawn-dusk oriented IMF, magnetic flux circulation is not well understood, and the inner magnetosphere does not receive energy. Several models have been suggested for possible reconnection patterns; the general pattern is: dayside merging; reconnection on the dayside or along the dawn/dusk regions; and, return flow on dayside only. These models are consistent with the lack of energy in the inner magnetosphere. We will present evidence that the Dungey cycle does not explain the energy transfer during dawn-dusk oriented IMF. We will also present evidence of how magnetic flux does circulate during dawn-dusk oriented IMF, specifically how the magnetic flux reconnects and circulates back.